No. 760,234. PATENTED MAY 17, 1904.

E. McCLINTOCK.

ELECTRIC CAB SIGNAL.

APPLICATION FILED SEPT. 5, 1903.

NO MODEL. 4 SHEETS—SHEET 1.

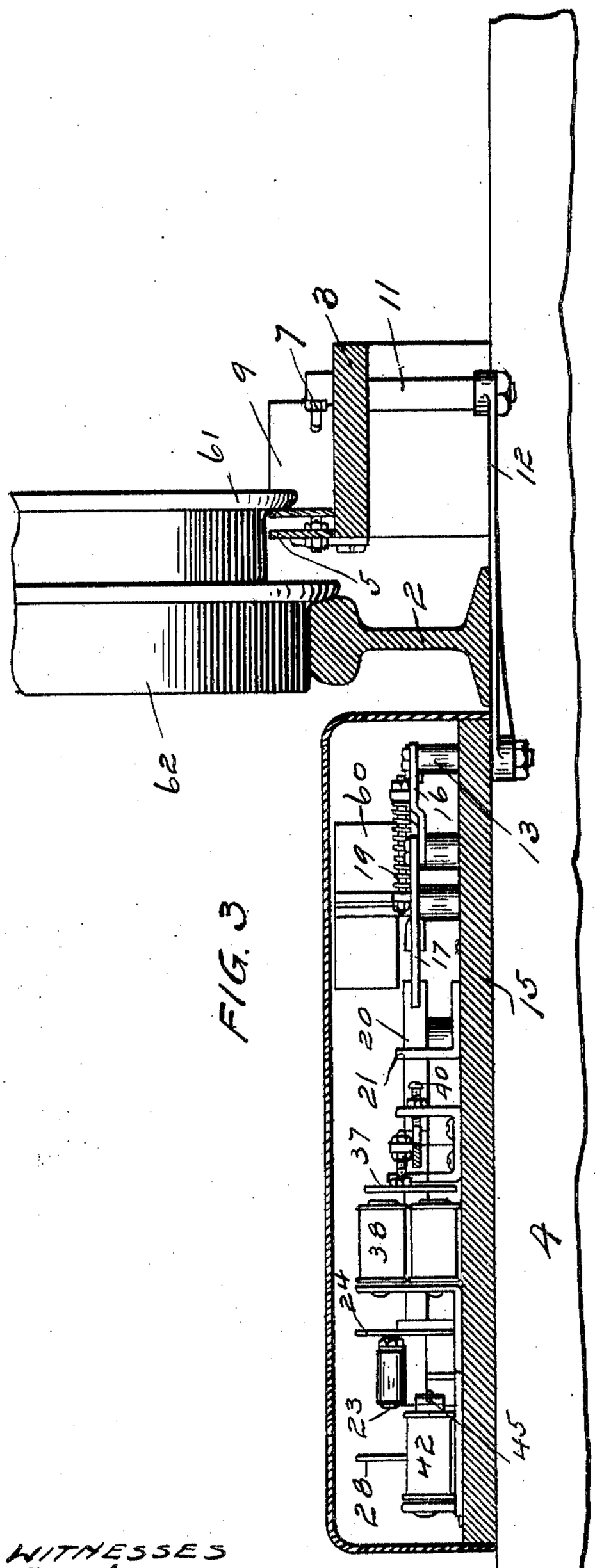

FIG. 3

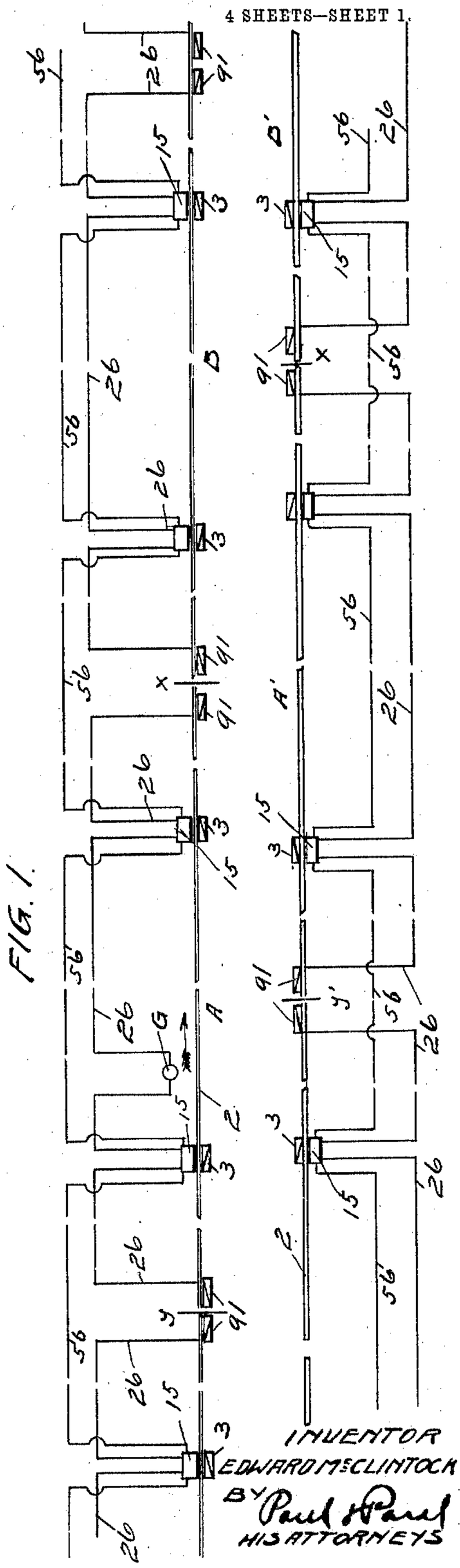

FIG. 1.

WITNESSES

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NO MODEL. 4 SHEETS—SHEET 2.

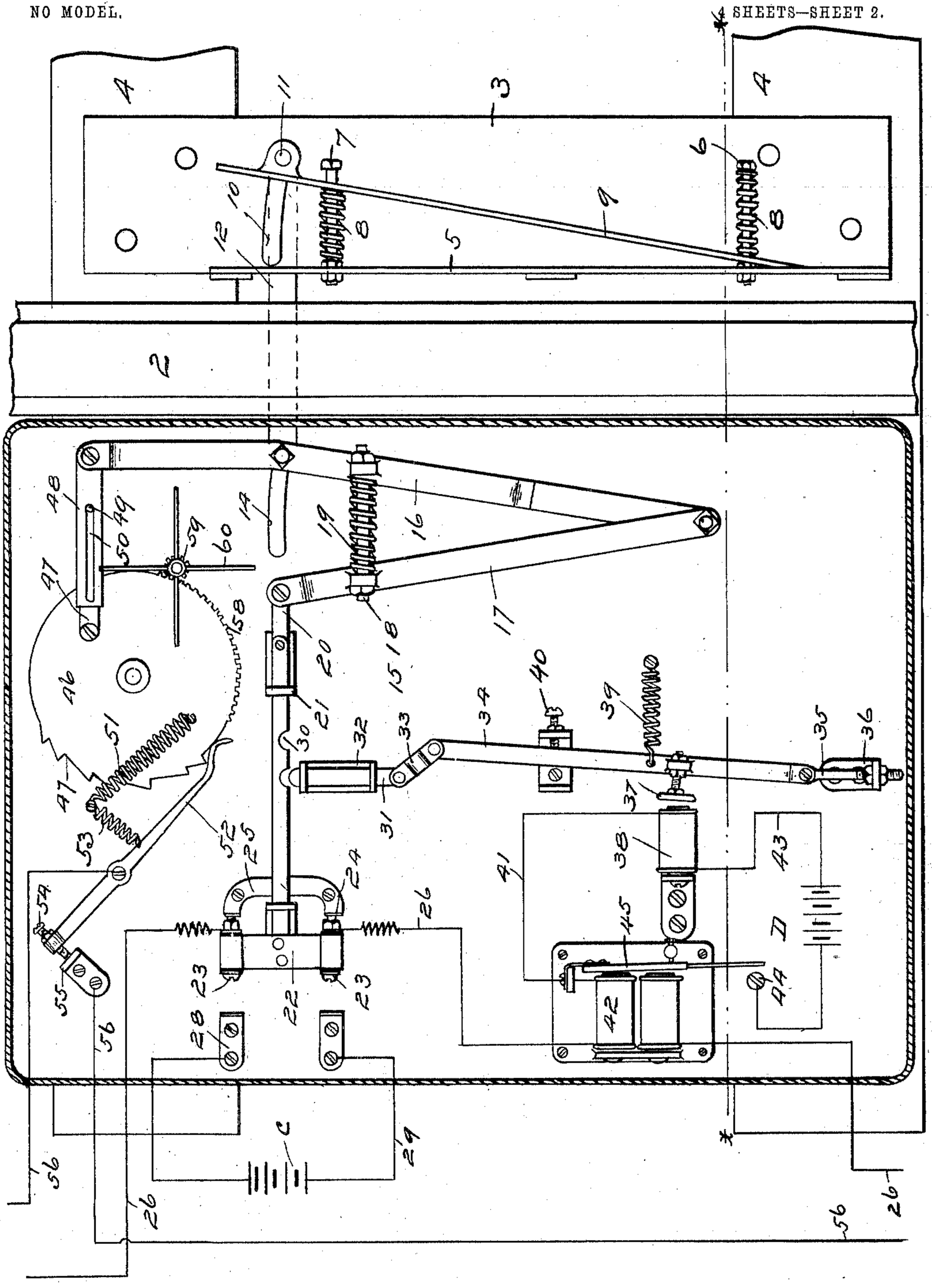

FIG. 2.

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NO MODEL. 4 SHEETS—SHEET 3.

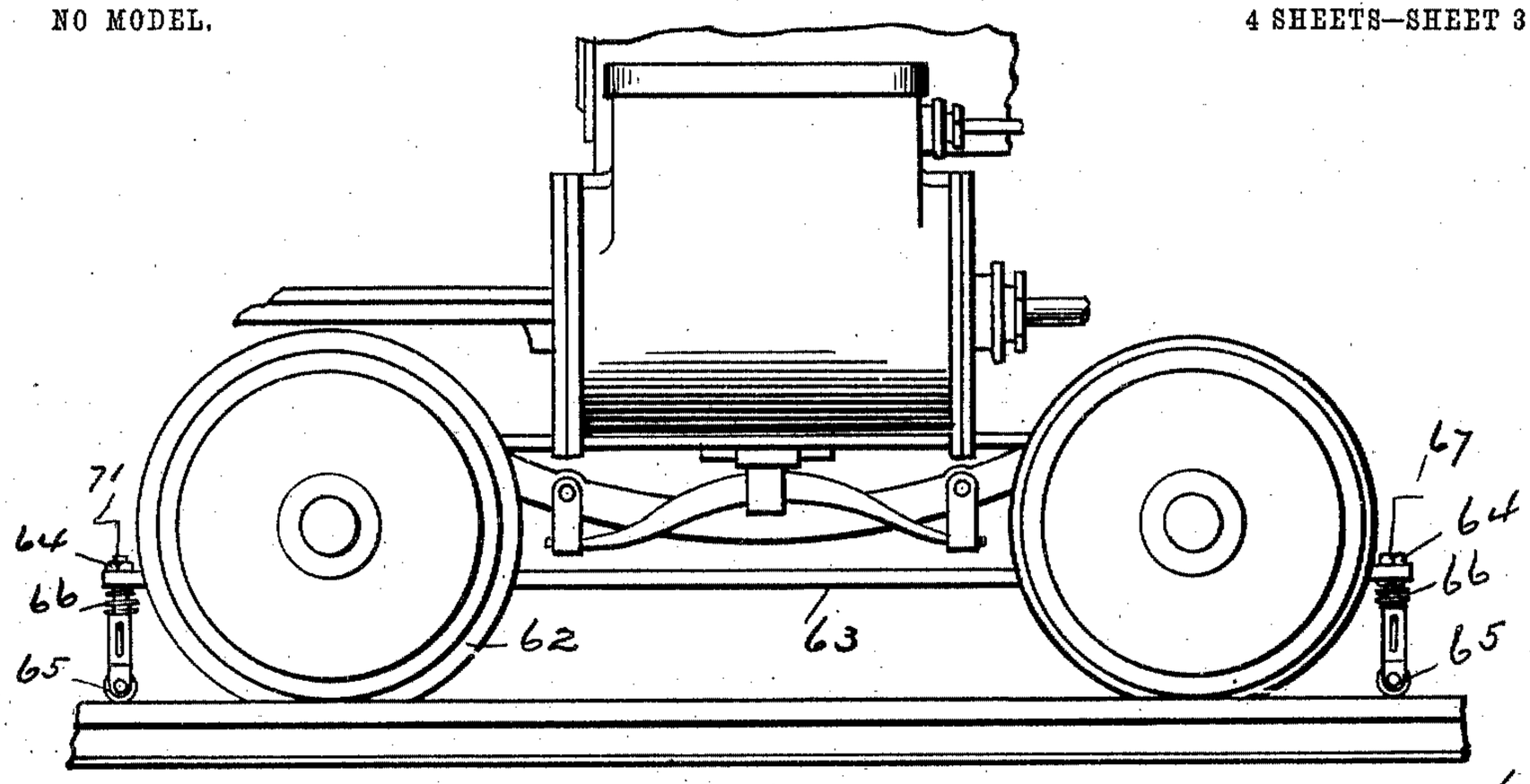

FIG. 7.

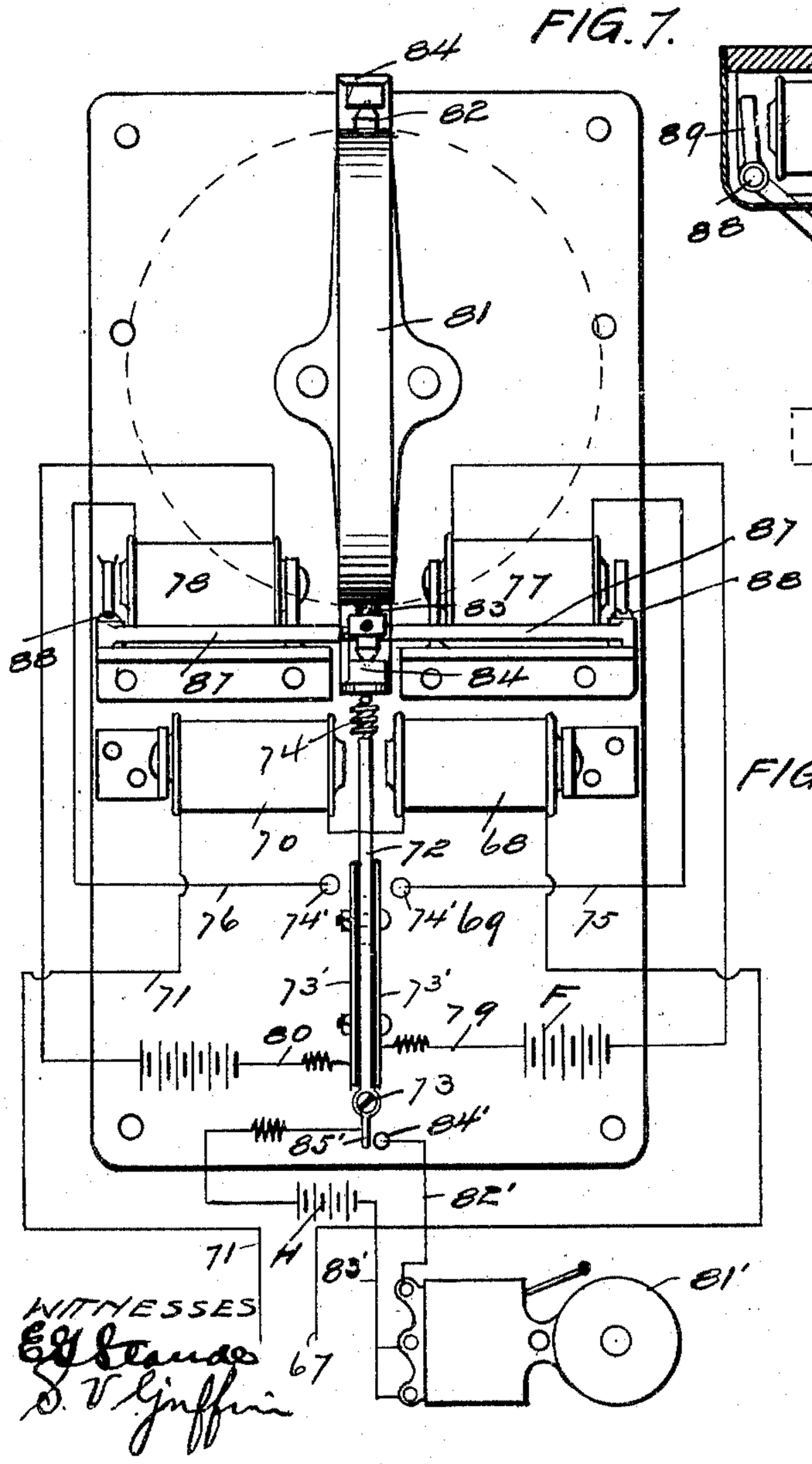

FIG. 4.

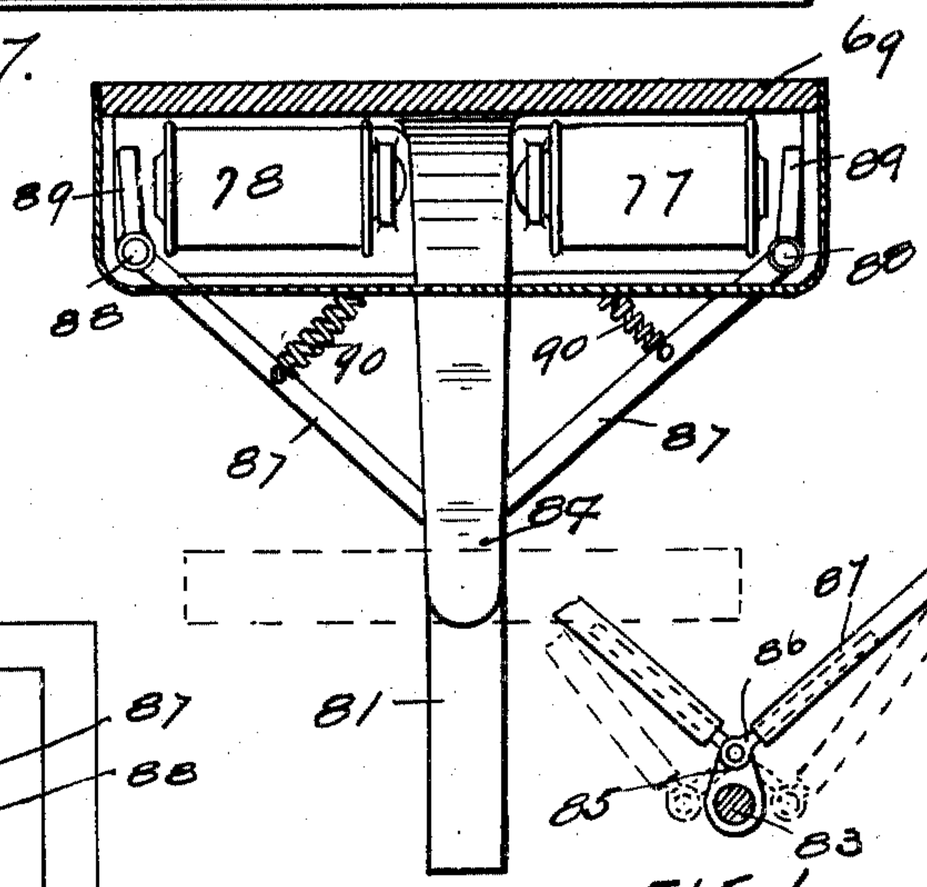

FIG. 5.

FIG. 6.

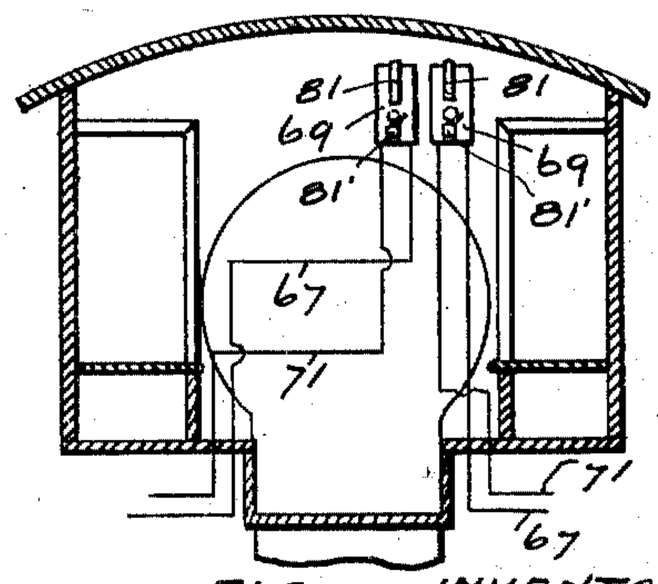

FIG. 8.

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APPLICATION FILED SEPT. 5, 1903.

NO MODEL. 4 SHEETS—SHEET 4.

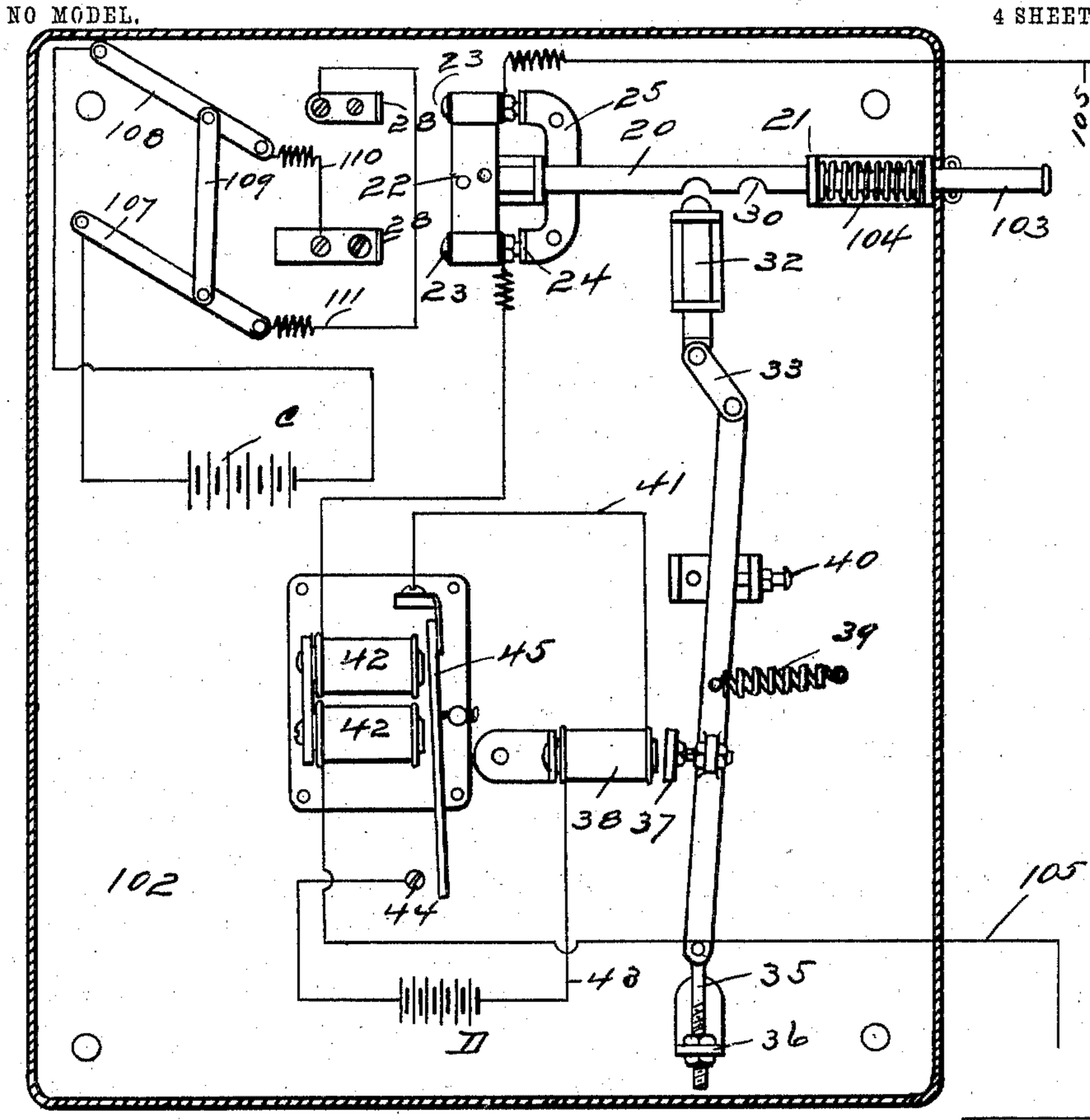

FIG. 10.

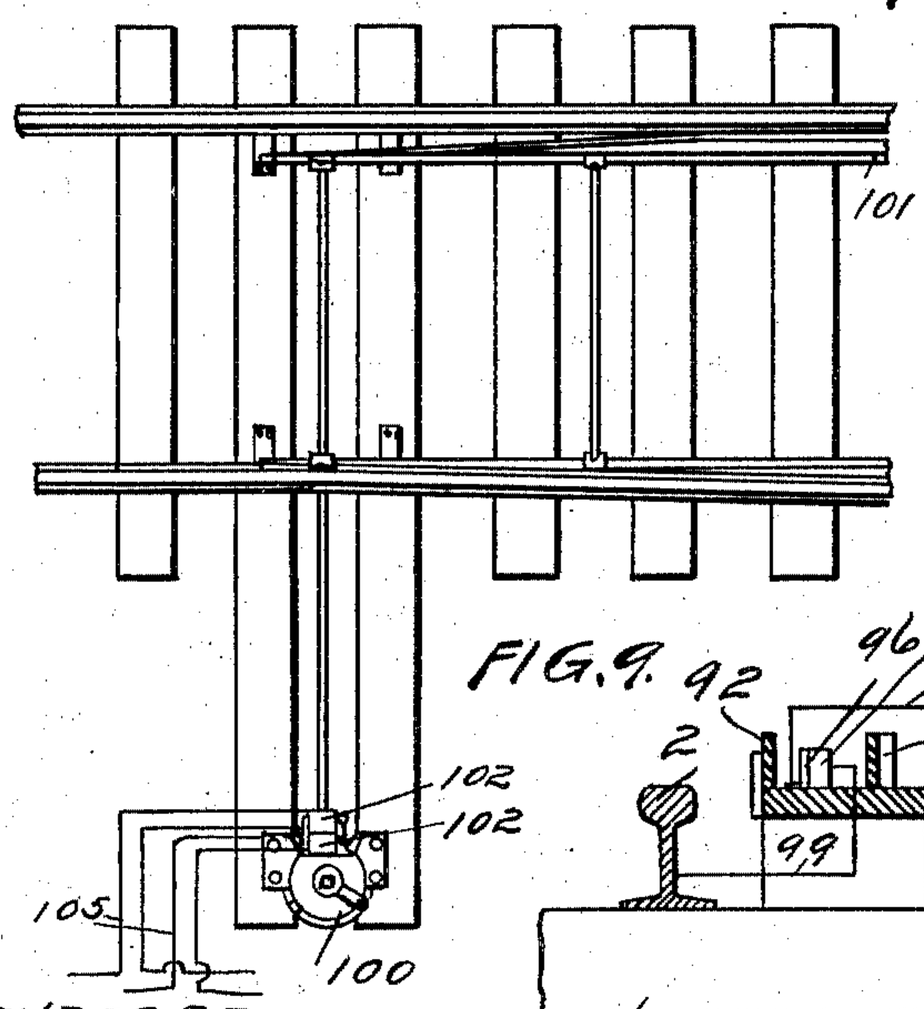

FIG. 9.

FIG. 12.

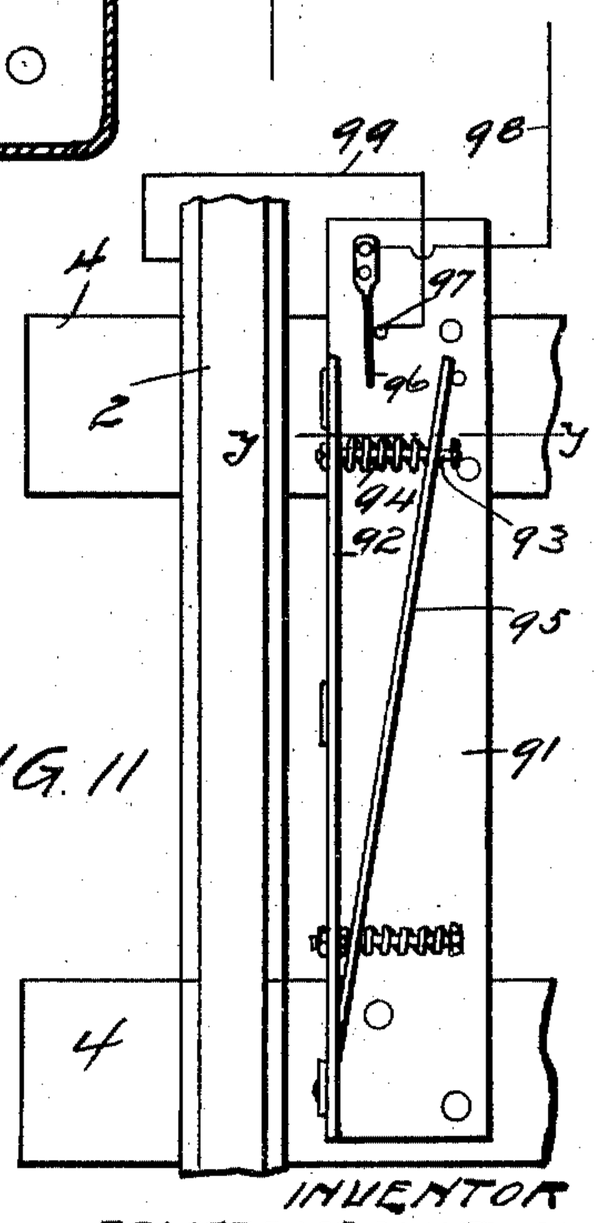

FIG. 11

WITNESSES
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No. 760,234. Patented May 17, 1904.

UNITED STATES PATENT OFFICE.

EDWARD McCLINTOCK, OF MERRIAM PARK, MINNESOTA, ASSIGNOR OF TWO-THIRDS TO F. E. BUTLER AND EDWARD MIERKE, OF ST. PAUL, MINNESOTA.

ELECTRIC CAB-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 760,234, dated May 17, 1904.

Application filed September 5, 1903. Serial No. 172,050. (No model.)

To all whom it may concern:

Be it known that I, EDWARD McCLINTOCK, of Merriam Park, county of Ramsey, State of Minnesota, have invented certain new and useful Improvements in Electric Cab-Signals, of which the following is a specification.

My invention relates to automatically-operated electric signals designed particularly for use on steam-railway systems; and the object of the invention is to provide means operated by the passage of a train past a given point for influencing a signal in the locomotive-cab or beside the track, or both, to announce the presence of another train within a certain predetermined distance moving in either direction, and thereby prevent head and rear end collisions.

A further object is to provide means for transmitting an electric signal indicating that a train has passed a given point on the road.

A further object is to provide a pole-changing mechanism located near the switch by means of which the poles of the electric current may be changed when a train enters a siding.

Other objects of the invention will appear from the following detailed description.

The invention consists generally in various constructions and combinations, all as hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a diagrammatic view of a section of railroad with my invention applied thereto. Fig. 2 is a detail of the circuit closing and locking mechanism. Fig. 3 is a section on the line $x\,x$ of Fig. 2. Fig. 4 is a front view of the cab-signal device. Fig. 5 is a top view. Fig. 6 is a detail view of the signal-operating mechanism. Fig. 7 is a side elevation of a locomotive-truck, showing the contact-wheels supported thereon. Fig. 8 is a view of the interior of a cab, showing the preferred location of the cab-signals. Fig. 9 is a view of a switch, showing the location of the pole-changing mechanism. Fig. 10 is a detail of the switch-pole-changing devices. Fig. 11 is a detail of the circuit-breaking mechanism, and Fig. 12 is a section on the line $y\,y$ of Fig. 11.

In the drawings, Fig. 1, 2 represents the track-rails, that are divided into blocks or sections, preferably about six miles in length, the block on one side of the track overlapping the corresponding block on the other side to avoid the possibility of two trains meeting at the ends of adjoining blocks. In Fig. 1 I have for clearness of illustration and description indicated the blocks by letters A and B on one side of the track and A′ and B′ on the other side. The rails on each side of the track are continuous, there being no insulation between them; but each block contains an independent circuit, and for convenience of illustration I have indicated in Fig. 1 the ends of the blocks by cross-lines x and y and x' and y'. In each block there are two circuit-closers and two circuit-breakers, the latter being at the ends of the block and the former arranged intermediate thereto, preferably about half a mile distant from the circuit-breakers. When a train enters a block, it will pass along therein a certain predetermined distance until a circuit-closer is reached, when a circuit will be established through a cab-signal in the locomotive and, if preferred, simultaneously through a stationary signal beside the track. This circuit-closer I will now proceed to describe in detail, reference being had particularly to Figs. 2 and 3 of the drawings.

3 is a plate spiked to the ties 4 between the rails and having a vertical flange 5 on its outer edge supporting bolts 6 and 7, on which springs 8 are coiled. A bar 9 is loosely mounted on said bolts on the outside of the spring thereon at one end and on the inside of the other spring. (See Fig. 2.) The pressure of the springs tend to hold one end of the bar against the flange 5 and the opposite end of the bar away from said flange. The plate 3 is provided with a transverse slot 10, wherein a stud 11, mounted at its upper end on the bar 9 and connected at its lower end to a rod 12, is movable. The outer end of the rod 12 is connected to a post 13, that reciprocates in a slot 14 in the bottom of a casing 15, that is arranged on the outside of the track near the rail 2. A bar 16 is pivoted at one end on the bottom of said casing and at a point interme-

diate to its ends is connected to the post 13 to be operated thereby, and a shorter bar 17 has a common pivot with the bar 16 at one end and is slidably connected therewith, near its opposite end, by a bolt 18, carrying a coil-spring 19, that tends to hold the said bars together. A rod 20, pivotally connected with the free end of the bar 17, is slidable in a guide 21 on the bottom of said casing and is provided with a head 22, carrying contact screws or bolts 23, that are insulated from said head and from each other and are normally held in contact with the upwardly-turned ends 24 of a plate 25 by the tension of the spring 19. A wire 26 leads from one of the contact-bolts 23 to a circuit-breaker at the end of the block, as will hereinafter appear, located at a distance, preferably, of about five miles from the first circuit-closer.

28 represent contact-surfaces within the casing 15 in the path of the head 22, adapted to contact with the bolts 23 when the arm 16 is reciprocated by the passage of a train. A wire 29 connects the contact-surfaces 28 and is provided with a battery C. The wire 26 forms an alarm-circuit that is closed through the cab of a locomotive on the passage of a train, and I prefer to omit batteries from this circuit, as it is normally closed by the engagement of the contacting pins 23 with the surfaces 24 and arranged for the passage of an electric current through the circuit when the pins 23 engage the surfaces 28. The rod 20 is preferably provided with notches 30, adapted to receive a reciprocating pin 31, operating in a guide 32 within said casing and connected by a link 33 with a bar 34, that is pivotally connected to a bolt 35, adjustably mounted in a bracket 36. An armature 37 is mounted on the bar 34 and is yieldingly held out of contact with an electromagnet 38 by a spring 39, the travel of said bar being regulated by means of a set-screw 40. A wire 41 connects the magnet 38 with a pair of magnets 42, and a similar wire 43 leads from the magnet 38 through a battery D to a contact-post 44. This post is in the path of an armature 45, provided near the magnets 42, and when the said magnets are energized the armature 45 will contact with the post 44 and close the circuit through the magnet 38 and operate the armature 37 to oscillate the bar 34 and move the pin 31 into one of the notches 30 and lock the rod 20 against reciprocation.

It is sometimes desirable to have a signal or message transmitted to a central office or other point when a train has passed over a certain point on the road, and I therefore provide means in connection with the circuit-closer for opening and closing a telegraph-circuit and transmitting a series of impulses indicating the marks of a telegraph-code. I therefore provide a disk 46, centrally pivoted in said casing and eccentrically connected with a plunger-rod 47, that is slidable in a tube 48 and has a pin 49 passing through a slot 50 in said tube and limiting the relative movement of the said rod and tube. The latter is pivotally connected with the arm 16 and is actuated by the movement of said bar to partially revolve the disk 46, which is provided on its periphery with a series of teeth 47, that are graduated in length to represent dots and dashes of a telegraph-code. A spring 51 tends to hold the disk 46 with the pin 49 at the inner end of the slot 50, and a key 52, pivoted at a point intermediate to its ends, has one end bearing on the teeth 47 and is held in yielding engagement therewith by a spring 53, while the other end of said key is provided with an adjusting-screw 54, bearing on a contact-surface 55. The key and contact-surface are connected with a telegraph-wire 56, strung along the track in the usual way, and I prefer to mount the alarm-circuit wires and the telegraph-wires upon the same pole, though they may be arranged independently of each other, if preferred. The disk 46 is also provided on its periphery with a series of small teeth 58, adapted to engage a pinion 59 on a fan 60, which is revolved by the movement of said disk and regulates the speed thereof both forward and back. The circuit through the key is normally closed and is broken and closed alternately when the key is actuated by the partial revolution of said disk.

Each circuit-closer battery C will be of opposite polarity, and each alarm-circuit will be normally open when there are no trains in the block, and each telegraph-circuit through each closer will be normally closed and affected only by the passage of a train to transmit a signal to the despatcher or any other desired place on the line. Each circuit-closer will be equipped with a telegraph mechanism, and the teeth of the disks in each circuit-closer will be differently arranged. For instance, one circuit-closer may be equipped with a mechanism that will transmit the letter "A," the next circuit-closer the letter "B," and so on. The numerals may be employed, if preferred, and as the despatcher or other officials having charge of the trains in a division being provided with a diagram showing the proper calls represented by each circuit-closer will know when a certain signal comes in over the wires that a train has passed over a certain section of the track where a circuit-closer containing the mechanism for transmitting a given signal is located it is thus possible to ascertain the location of any train on the road, even when between stations, and be advised of how near together the trains are running.

To operate a circuit-closer, I prefer to provide a flange 61 (see Fig. 3) on the inside of the wheels 62 in position to engage the bar 9 when the train is moving in one direction to press said bar in toward the flange 5 and operate the circuit-closer mechanism. A similar flange will be provided on the opposite

wheel to operate the circuit-closer on the other side of the track. The bar 9 being pressed in toward the rail by the passage of a train, the alarm-circuit will be closed through both circuit-closers. In the one the train has passed over the rod 20 will be reciprocated to move the contact-pins 23 into engagement with the surfaces 28, and when this has been done the circuit will be closed through the magnets 42 and 38 to move the pin 31 into the notch that will be opposite the same to lock the bar 20 against backward movement when the flange 61 has passed over the circuit-closer. The circuit will also be closed through the other circuit-closer and the pin 31 moved into the notch 30 opposite the end thereof to lock the rod 20 and hold the pins 23 in contact with the ends 24. Then should a train enter the block from the other direction and pass over the last-named circuit-closer it will merely press the bar in toward the rail against the tension of the spring 8 without moving the circuit-closer mechanism, and the alarm-circuit will remain unbroken. If the train that closed the circuit upon entering the block passes over the second circuit-closer, it will merely press one end of the bar 9 toward the opposite side of the track a sufficient distance to allow the flange 61 to pass without affecting the circuit-closer mechanism or the alarm-circuit, which will remain unbroken until the train passes over the circuit-breaker and out of the block.

63 (see Fig. 7) represents a locomotive-truck frame supporting pins 64, whereon contact-wheels 65 are mounted on both sides of the truck-frame and normally held in engagement with the top of the rail by springs 66. A wire 67 leads from one of the contact-wheels up to the locomotive-cab and is there connected to an electric magnet 68, mounted on a base 69. (See Fig. 4.) A similar magnet 70 is arranged opposite the magnet 68, with their adjacent ends connected, and said magnet 70 is connected by a wire 71 with the other contact-wheel on the locomotive. Between the adjacent ends of the magnets 68 and 70 I provide a permanent magnet 72, pivotally supported at its lower end on a stud 73 and yieldingly held at its upper end by a spring 74, that is adapted to yield and allow movement of the upper end of said magnet toward the cores of the magnets 68 and 70. Contact-plates 73′ are provided on the permanent magnet 72, insulated therefrom and from each other and arranged to contact with posts 74′, provided upon each side of said permanent magnet and connected by wires 75 and 76 with magnets 77 and 78. Wires 79 and 80 connect the plates 73′ through batteries F with the magnets 77 and 78. Thus two independent circuits are formed that are alternately closed and opened by the engagement of the plates 73′ with the posts 74. Between the magnets 77 and 78 is a disk 81 that is red upon side and white on the other and provided with studs 82 and 83, that are arranged to revolve in bearings 84. A crank 85 is provided on the stud 83 and has pins 86 pivotally connected therewith that are slidable in tubes 87, mounted at one end upon pins 88 and provided with armatures 89, that lie in the field of the magnets 77 and 78. (See Figs. 5 and 6.) Springs 90 normally hold the armatures 89 out of contact with their magnets. When, however, one of the magnets is energized by the contact of the plate 73′ with the post 74, its magnet will be actuated to swing the tube 87, partially rotate the crank 85, and revolve the disk 81 from a neutral position, such as is shown in Fig. 4, to one where either the red or white side will be visible, according to the direction that a train is moving in the block. Two of these visual signals are provided in the cab of each locomotive, (see Fig. 8,) one being affected by the closing of the circuit on one side of the track and the other by the closing of the circuit on the other side, and as these signals are identical in construction and operation and as the circuit closers and breakers are the same upon each side of the track, only being arranged so that the blocks overlap each other, it is not necessary to enter into a detailed description of both sets, the second or duplicate alarm system being provided merely to prevent any possibility of two trains meeting at the adjacent ends of two blocks. As indicated at G in Fig. 1, I may arrange a signal-post opposite the track, connected with the alarm-circuits and actuated by the closing of the circuits on the passage of a train to display the proper signals. This track-signal will be merely a duplication of the cab-signals, and I have not thought it necessary to show the same in detail herein.

I prefer to provide an audible signal in each cab, consisting of a bell 81′, connected by wires 82′ and 83′ with a battery H and with a contact-post 84′, that is engaged by a contact-point 85′ as the permanent magnet 72 is oscillated to close the circuit and expose the red signal. This audible signal warns the locomotive engineer that a train is approaching in the same block from the other direction.

At the ends of each block I provide circuit-breakers oppositely arranged, as is the case with the circuit-closers, one to be operated by the passage of a train in one direction and the other by the passage of a train in the other direction. Each circuit-breaker comprises a plate 91, secured on the ties between the rails, having a flange 92, carrying bolts 93, provided with springs 94 and a bar 95, one end of which between the spring and the rail and the other at the inner end of the spring. A contact-spring 96 is provided on the plate 91, normally in engagement with a post 97 and projecting into the path of the bar 95. A wire 98 connects the spring 96

with the alarm-circuit wire, and a wire 99 connects the post 97 with the rail. The engagement of the bar 95 with the spring 96 will break the alarm-circuit and allow the circuit-closer to return to its normal position.

In operation a train entering the block A, for instance from the left, will pass over the circuit-breaker at that point and travel along until it reaches the first circuit-closer, which will operate to move the contact-pins 23 into engagement with the surfaces 28 and close the circuit through the other closer, the circuit-breakers, the wires 26, and the rails. The circuit will also be closed through the batteries D in both closers to actuate the pins 31 to lock the rods 20 and prevent the circuit from being broken after the train entering the block has passed over the first circuit-closer and prevent a train that might enter the opposite end of the block from operating the second circuit-closer. The train entering from the left having passed over the circuit-closer will move along in the block, the current flowing along the rails in the same direction as the train, and the circuit will remain closed until this train passes over the circuit-breaker at the end of the block. Suppose, however, a second train enters the block A from the same direction before the first train has passed out of it. As soon as the second train passes over the circuit-breaker at the beginning of the block a portion of the current will pass up through the contact-wheels 65 and into the cab through the signal therein. It is not essential that the full strength of the current pass up through the cab; but I insure the passage of a portion of it by arranging the contact-wheels a sufficient distance apart, so that the resistance to the electric current up through the cab will be nearly equal to or less than the resistance of the rails. The current flowing in the same direction that the second train is moving will pass up along the wire 67, for instance, into the electromagnet 68 and from thence to the opposite magnet 70, the opposite pole of which is adjacent to the negative pole of the magnet 68. One of these arms then, depending upon the direction of flow of the current, will attract the unlike pole of the permanent magnet 72, while the other electromagnet for a corresponding length of time will repel it. This period of time will be sufficient to cause the magnet 72 to oscillate sufficiently to close one of the circuits through the magnets 77 and 78, for instance through the wire 75, whereupon the magnet 77, being energized, will attract its armature, partially rotate the disk 81, expose the white signal to view, and warn the engineer of the second train that there is a train in the block ahead of him moving in the same direction, assuming that the visual signal is adjusted to exhibit the white side when the circuit is closed, as above described. If during the time the second train is between the circuit-breaker at the beginning of the block and the first circuit-closer the cab-signal remains neutral or does not show either the white or red side, the engineer will then know that the block ahead is clear of trains. Suppose, however, before this last-named train has entered the block A, moving toward the right, that another train enters the same block at the other end and moving toward the left. This train entering from the right will operate the circuit-closer at that end of the block and the current will flow in the same direction as the train, as above described. Then if a train enters the block from the left hand it will meet a current flowing in the opposite direction, which passing up through the locomotive-cab and back to the rail will energize the magnets 68 and 70 and being of opposite polarity from the current first described will cause the permanent magnet to be momentarily attracted by the electromagnet 70 to close the circuit through the wire 76 and the magnet 78, rotate the disk in the opposite direction, and expose its red face to view, warning the engineer that a train is in the same block approaching from the other direction. Simultaneously with the operation of the visual signal to expose the danger or red side the circuit will be closed through the alarm-bell to call the engineer's attention to the fact that a train is approaching in the block from the other direction. As each train passes over the circuit-closer the telegraphic mechanism heretofore described will be actuated to transmit a message over the wires to the despatcher that a train has passed over a certain section of the track.

It sometimes happens that a train after entering a block desires to pass on to a siding, and in Figs. 9 and 10, therefore, I have shown a mechanism by means of which the trainmen can reverse the poles of the current and change the direction of its flow along the rails. In Fig. 9, 100 represents an ordinary switch-stand connected with the switch-rails 101 in the usual manner. 102 (see Fig. 10) represents a suitable casing wherein the mechanism is arranged, consisting of substantially the same circuit-closing and locking devices employed in the circuit-closer heretofore referred to, except that the rod 20 instead of being connected to an oscillating bar is provided with a handle 103, that projects through the wall of the casing 102 and is adapted to be pressed in and moved longitudinally against the tension of the spring 104. Wires 105 lead from the alarm-circuit wire opposite the track down to the switch. In connection with the battery C employed in the switch device I prefer to provide a pole-changing mechanism consisting of bars 107 and 108, pivoted at one end on the casing 102 and connected by a link 109 and in circuit at one end with the battery C and connected at their other ends by wires 110 and 111 with the contact-surfaces 28. When the handle 103 is pressed

in, the circuit will be closed through the battery C in the same manner as heretofore described with reference to Fig. 2; but in case a train has entered a siding within the block and the engineer desires to convey the intelligence to the engineer of a train approaching from the opposite direction that the track is clear the bars 107 and 108 will be swung on their pivots to contact with the surfaces 28, thereby changing the poles and reversing the direction of flow of the current, so that if a train enters the same block where another train is standing on the siding that has been moving in the opposite direction the engineer of the first-named train will be notified by the exposure of the white side of his visual signal that the main track ahead is clear. Upon leaving the siding the trainmen can restore the pole-changer to its normal position, so that when the train passes on to the main track the current will flow along the rail in the same direction and cause the red side of the signal to be exposed in the cab of a locomotive that enters the block from another direction. A train upon entering a block will close the circuit therethrough, which will remain unbroken until the train passes over the circuit-breaker at the end of the block, and as it will then immediately enter another block it follows that the train will at all points along the line be within closed electric circuits which will operate signal devices to warn the engineer of the train if another train is in the same block moving in the same or opposite direction. When the train passes over a circuit-breaker and out of the block, the circuit through the closers will be broken and the mechanism returned to its normal position.

I claim as my invention—

1. The combination, with a locomotive and the track-rails, of normally open alarm-circuits connected therewith and dividing the rails into independent blocks or sections, circuit closers and breakers provided in each alarm-circuit, the latter being at the ends of the blocks and the former intermediate thereto and both arranged to be operated respectively by the passage of trains in opposite directions to alternately close and open said alarm-circuits, and a signal device provided in the locomotive-cab and having connections contacting with the rails, substantially as described.

2. The combination, with the track-rails, of normally open alarm-circuits connected therewith and dividing the rails into a series of blocks or sections, circuit closers and breakers provided in each block, the latter being at the ends thereof and the former intermediate thereto and both arranged to be operated respectively by the passage of trains in opposite directions to close and open said alarm-circuits, a signal device provided beside the track in said alarm-circuit, for the purpose specified.

3. The combination, with a locomotive and the track-rails, of normally open alarm-circuits connected with the rails on both sides of the track and dividing the same into a series of overlapping blocks or sections, circuit closers and breakers provided in said alarm-circuits, the latter at the ends of the blocks and the former intermediate thereto and both arranged to be operated respectively by the passage of trains in opposite directions to close and open said alarm-circuits, and cab signal devices having connections contacting with the rails, substantially as described.

4. The combination, with a locomotive and the track-rails, of normally open alarm-circuits connected therewith and dividing said rails into a series of blocks or sections, circuit closers and breakers provided in said alarm-circuits, the latter being located at the ends of a block and the former intermediate thereto, the adjacent closers and breakers in the same block being oppositely arranged and operated respectively by the passage of trains in opposite directions, a cab signal device having connections that contact with the rails, and means for locking one of said circuit-closers when the other is operated by the passage of a train, substantially as described.

5. The combination, with a locomotive and the track-rails, of a normally open alarm-circuit dividing the rails into blocks or sections, a circuit-closer, a flanged wheel provided on the locomotive and arranged to engage and actuate said circuit-closer, contact-wheels provided on the locomotive and bearing upon the rails, and a cab signal device connected with said contact-wheels.

6. The combination, with the track-rails, of a normally open alarm-circuit connected therewith, a circuit-closer comprising a yieldingly-held bar, a reciprocating rod connected therewith, contact-pins carried by said rod, contact-surfaces in the path of said pins, means carried by the locomotive to engage and actuate said bar, contact-wheels, and a cab signal device connected with said wheels.

7. The combination, with the track-rails, of a normally open alarm-circuit connected therewith, a circuit-closer provided in said alarm-circuit and comprising a bar, springs arranged to hold one end of said bar toward the rail and the other one away from the same, a reciprocating rod having pivotal connections with said bar, contact-points provided on said rod and in the alarm-circuit, contact-surfaces having a battery-circuit in the path of said pins, means provided on the locomotive for operating said bar, means contacting with the rail, and a cab-signal connected with said contacting means.

8. The combination, with a locomotive and the track-rails, of a normally open alarm-circuit connected therewith, a circuit-closer in said alarm-circuit arranged to be operated by the passage of a train, a normally closed telegraph-circuit, and means connected with said circuit-closer and said telegraph-circuit, and

means for transmitting a series of impulses over said line representing the characters of a code, substantially as described.

9. The combination, with the locomotive and the track-rails, of a normally open alarm-circuit connected therewith, a circuit-closer arranged to be operated by the passage of a train, a rotating disk connected with said circuit-closer and having a series of teeth of different length in its periphery, a normally closed telegraph-circuit, and a key in said telegraph-circuit having one end bearing on said teeth and its other end upon a contact-surface, substantially as described.

10. The combination, with the track-rails, of a normally open alarm-circuit connected therewith, a circuit-closer operated by the passage of a train, a telegraph-circuit, a rotating disk having a series of ratchet-teeth of different length in its periphery and also a series of gear-teeth, a fan having a pinion engaging said gear-teeth, and a key in said telegraph-circuit having one end yieldingly held in engagement with said ratchet-teeth and its other end bearing upon a contacting surface in said telegraph-circuit, substantially as described.

11. The combination, with a locomotive and the track-rails, of a normally open alarm-circuit connected therewith and dividing the track into a series of blocks or sections, circuit closers and breakers provided in said alarm-circuits, the latter being located at each end of a block and the former intermediate thereto and arranged to be operated respectively by the passage of trains in opposite directions, and signal devices provided in a locomotive-cab and having contacting devices with the rails, said signal device comprising a rotating disk, magnets mounted thereon, armatures connected with said disk to rotate the same when said magnets are energized.

12. The combination, with the rails, of a circuit-closer comprising a yieldingly-held bar, an oscillating arm connected with said bar, a reciprocating rod pivotally connected with said arm, contact-points carried by said rod, a normally open alarm-circuit connected with said contact-points, contact-surfaces arranged to engage said points and close said alarm-circuit when said circuit-breaker is actuated, and means for locking said rod to hold said points in contact with said surfaces, for the purpose specified.

13. In an electric cab signal device, a circuit-closer, comprising a yieldingly-held bar arranged near the track-rail, an oscillating arm connected with said bar, a reciprocating rod having yielding connections with said arm, a head carried by said rod and provided with contact-points insulated therefrom, a plate having ends in the path of said contact-points and engaging the same when said circuit-closer is in its normal position, an alarm-circuit connected with said points and normally open, and circuit-closing devices arranged in the path of said points to be engaged thereby when said closer is operated.

14. The combination, with the track-rails, of a bar adjacent thereto, bolts whereon said bar is slidably mounted, springs provided on said bolts and arranged to hold one end of said bar toward the rails and the other away from the same, an alarm-circuit, and a making and breaking mechanism connected with said bar and with said circuit.

15. In an electric cab signal device, a rotating disk, electromagnets near the same, armatures therefor, means connecting said armatures and the axis of said disk for rotating the same in opposite directions, and means for alternately closing a circuit through said magnets, substantially as described.

16. In an electric cab signal device, a rotating disk, electromagnets provided near the same, armatures pivoted near said magnets, a crank provided on the axis of said disk, means connecting said armatures and said crank, and means for alternately closing and opening an electric circuit through said magnets.

17. In an electric cab signal device, an oscillating permanent magnet, electromagnets of opposite polarity between which said permanent magnet is arranged, an electric circuit connected with said magnets, a visual signal device, independent circuits arranged to be closed alternately by the oscillation of said permanent magnet, and electromagnets arranged in said independent circuits and having their armatures connected with the axis of said disk.

In witness whereof I have hereunto set my hand this 1st day of September, 1903.

EDWARD McCLINTOCK.

In presence of—
RICHARD PAUL,
S. V. GRIFFIN.